was 103, pulse 120. The child readily recognized attendants and seemed normal. The pupils reacted but were dilated, especially the left. When offered water she seemed adverse to drinking it. On persistent urging she was able to drink some with a great deal of difficulty, complaining of pain when she tried to swallow.

On August 15th the patient was highly nervous in the morning, afternoon, and night. She was very talkative, looking into space, seeming to see something with a look of terror. She would throw her arms around her mother and cry very sharply, then sob, then quiet down for a few moments. She would call for water and when offered it she would refuse to take it. There was no real convulsion. The fact that one merely spoke to her would cause a spasm of the face, head and arms, with a jerking of the head. These paroxysms would pass very shortly and then she would appear rational.

On August 16th the child was in a coma and died about 11:30 p. m. No autopsy was held. From the symptoms of this case there is no doubt that the cause of death was rabies, and again points out that complete immunity, even with the intensive Pasteur treatment, is not established fast enough.

No. 36. M. P., a man, age 36, died or rabies on May 8, 1916, at Bieber, Lassen County.

That this patient was bitten could not be established. Investigation showed that a neighbor owned four dogs, one of which, after fighting with a coyote, was shot about two months before when symptoms of rabies were noticed. Shortly after this one of the dogs, with an injured foot, was cared for by the patient. This animal died three or four days later with typical symptoms of rabies. The patient's hands were always cracked and cut, and the supposition is that the infection was probably contracted in this manner. This case is similar to S. N., reported in the previous paper,[2] in that no history of a bite was obtained and that the symptoms were a laryngeal pharyngeal paralysis.

Portion of the brain tissue sent to the State Hygienic Laboratory was positive for rabies on microscopical examination and animal inoculation. It is interesting to note that sixteen persons were given the Pasteur treatment as actual contacts of this case.

References.

1. Geiger, J. C. Human Cases of Rabies in California and Their Treatment. California State Journal of Medicine, June, 1916.
2. Geiger, J. C. The Work of the Pasteur Division of the State Hygienic Laboratory. California State Journal of Medicine, August, 1913.

RECENT WORK IN EPILEPSY.*

By EDWARD W. TWITCHELL, M. D., Sacramento.

Epilepsy has so long been one of the opprobria medicorum that we welcome any thing new of promise, either in respect of cause or of treatment, even if the promise be a bit vague. I have endeavored to put together the results of a search of the literature of the subject covering the last three or four years.

The methods of research are so largely biochemical and bacteriological that they present a striking contrast to the methods of not so many years ago when the histological method was almost the exclusive one.

In therapy, the combination bromide-dietetic treatment is that which seems to be the prop of the great majority, and in this majority are included the men who are directors of large institutions for the care of epileptics where opportunity for observation and treatment of vast numbers of patients is afforded. Those who condemn as worthless or harmful the bromide treatment are apt to be those who have discovered marvelous new remedies which relegate all others to oblivion.

I shall abstract some of the more important articles, commenting on them as I go, and taking up those first which consider the etiology. It is not to be supposed that this is a complete review of the literature. Some very important papers have no doubt been overlooked, and I can certify that I have read a number that hardly paid for the time of looking them through.

H. Aimé cites the following passage from A. Leroy (Paris Medical, June 2, 1913): "Asthma and epilepsy are probably two manifestations of the same disease. Certain albuminoid products of the placenta, the thyroid, the ovary, testicle, etc., or of globulins set free by syphilis, peptones, albumoses, amino acids, etc., escaping the action of a defective liver, and coming from a sluggish intestine, get into the blood, whose osmotic tension they raise. They run toward the emunctories, and these failing, toward the dialyzing membranes of the economy, the pia and the choroid plexus. Here the phenomenon of the spasm is engendered. When the kidneys finally act, the crisis is over. If the tendency of the poisons is toward the alveolæ, an asthmatic attack results instead." This would be a convenient theory with which to account for those allied manifestations, puerperal eclampsia, and uraemia.

Aimé remarks that haemophiliacs are said never to become epileptics and says this is possibly attributable to the delayed coagulation time of the blood, but Thom (Epilepsia, June, 1915) says that epilepsy is not unknown among haemophiliacs, and that the coagulation time was normal in 92% of 203 cases examined by him.

G. Bolten in a careful article mentions Bra's neurococcus, to which I shall refer later. He refers to the work of Bratz, who found glia proliferation in only one-half of his cases and sclerosis of the cornu ammonis in a like percentage. Donath thought

* Read before the Sacramento Society for Medical Improvement July 18, 1916.

choline the cause of the disease. Bodily fluids of epileptics, according to Bolten, are very toxic to animals when injected. This is of course not new; I remember Voisin as far back as 1896 speaking of the extra toxicity of the urine of epileptics. Bolten regards epilepsy as consisting of a large number of conditions, the fit being merely the most striking symptom. He proposes the following classification of the epilepsies:

1st—Cerebral (secondary or symptomatic), a result of chronic meningitis or encephalitis, traumatisms of cranium, hydrocephalus internus, tumor, lues, etc.

2d—Epilepsy from endogenous intoxication, diabetes or uraemia.

3d—Epil. from exogenous intox., alcohol, absinth, tobacco.

4th—Affective epilepsy of neuropaths.

5th—Cardiogenic E. (Stokes-Adams).

6th—Epilepsia tarda.

7th—Essential epilepsy.

Bolten regards genuine or essential epilepsy as due to hypo function of the para-thyroids and a hypo intestinal fermentation.

One is somewhat astonished to learn from Ulrich that Ammon says that 62% of all epileptics die directly from the disease and that 42% die in an attack.

Hartmann and di Gaspero comment on the fact that while epilepsy has been recognized and described since the days of Hippocrates, it is only of late that it has been discovered that the fit is not essential to epilepsy, but in the next breath they tell you that one can never be certain of the disease without the fit. Epilepsy without the spasm certainly sounds like a lucus a non lucendo. H. and di G. lay stress on the variousness of pathological conditions which may produce the symptom of the fit, and stigmatize essential epilepsy as epilepsy without known cause. There must be underlying all cases of epilepsy, genuine, traumatic and other, some condition which makes this sort of manifestation possible. A sort of epileptogenic state, as if there were within the tissues an epilepsigen which needed only a final touch of one sort or another to make it active. Incidentally they show a chart accurately kept for over four years, showing that the number and severity of the attacks have nothing to do with the phases of the moon.

The census of middle Europe shows one epileptic to 1000 of population. Trousseau is quoted by H. and di G. as saying that no disease is so frequently mistaken as epilepsy. An occasional experience leads me to believe that there is some truth in this. Not only is epilepsy not recognized as epilepsy but other diseases are diagnosed as epilepsy.

Mention was made above of the neurococcus announced by Bra in Comptes Rendus Ac. d. Sc., Jan. 2, 1902. C. A. L. Reed of Cincinnati has caused a stir lately by confirming and amplifying the work of Bra and has made some very strong claims for his surgical methods in the treatment of epilepsy. Reed says that 100% of his cases are markedly constipated (I have not found out just how many cases he has had) and that several stools a day do not mean that there may not be a great mass of feces still in the colon that never cleared away. This he has found out by the fluoroscope. The only case that I have examined thus, a marked case of grand mal, emptied the colon completely and in less than normal time. Reed found the bismuth meal to stay for 60 hours or more. This stasis is supposed to cause an unusual fermentation and putrefaction with the growth of bacterial products, which upon absorption cause toxaemia. This he says causes a persistent acidosis, but he does not show to my satisfaction how he arrives at this conclusion. The saliva is acid in 100% of his epileptics; urine and sweat highly acid. This acidosis (nothing said of any determination of H ions in the blood) causes an edema of the type described by Martin Fisher—when this edema goes to a sufficient degree in the cerebral tissues there is a fit. No explanation is given as to why the fit ceases.

Bra found a coccus, in 70 of 100 cases, in the blood. He found it only in epileptics, and only before and after the fit. In the intervals the blood was sterile. Cultures injected into rabbits produced typical fits. Reed finds this organism in the blood, also in the caecum and in the appendix. Reed's latest paper describes the organism as a spore bearing bacillus. His conclusions are that:

1st—Epilepsy is caused by a specific infection, probably by a bacillus of the gas forming series.

2d—The infection is in the intestinal canal, probably first in the duodenum, but later in the caecum.

3d—The infection is made effective by constipation.

4th—Relief of constipation by operation cures epilepsy.

5th—Autogenous vaccine is a rational treatment.

Dr. Seavey has made numerous cultures of the urine in epileptics, before and after the attack, and has isolated a coccus apparently like Bra's. It runs to chains as a rule. She has lately isolated it from the blood of a patient whose urine was also full of the same growth.

Bra's work remained unnoticed for years and has received little confirmation yet. Still it was sixteen years that Mendel's work was ignored. It ought not to take very long to see if these findings of Bra and Reed are on a firm foundation.

Treatment: Aimé, who likens epilepsy to asthma, was impressed with the fact that a treatment he had used for the asthmatic was also very beneficial to certain epileptics. This treatment consisted in injections of sodium nitrate and caffeine.

Abregia and Urechia used intraspinal injections of 2% calcium chloride to the amount of 10 cc. The bromide of calcium was used in the same concentration and seemed preferable to the chloride. In all 86 patients were treated. Reactions: a—somnolence or sleep for 6 to 10 hours in a few cases; b—loss of tendon reflexes and paresis for 5 to 20 hours in the majority of cases; c—temperature of 38° to 39° C. for as long as 30 hours.

H. French says that biborate of soda in doses of 10 grains t. i. d. will often act wonderfully where the bromides have failed.

A. Gordan withdraws the spinal fluid from one

epileptic and injects it subcutaneously into another, never into the patient himself. He had remarkably good results in four cases, one of which had no lumbar puncture himself, but received the spinal fluid of another. This would seem a good way to transmit syphilis, unless great caution were used.

J. Hoppe summarizes the treatment in a large German Asylum for Epileptics. Salvarsan is used in all who are luetic, and the intramuscular method seemed better than the intravenous. Luminal and salvarsan should not be given at the same time. Iodides to the amount of 1 gm. a day are often advisable. Surgery has been a disappointment even in rather recent cases of injury and depression unless the cases were quite fresh. After four years it was useless. All in all, bromides had stood them best in stead. It takes some time to get the full effect, in fact ¼ to ⅛ of the chlorine in the blood must be replaced with bromine before one gets results. The idea should be to keep the chlorine at this point, and to this end the chlorine in the food should be constant in amount. As to choice of the salts, why worry over possible damage of the heart by 2 or 3 gms. of potassium salt when the patient on a potato diet gets 20 to 25 gms. of potassium salts daily?

Luminal is like veronal except that the ethyl group is replaced by a phenyl group. It works very well in doses of .05 to .1 t. i. d. Beware of the phenyl effect on the kidneys in long use, and increase the dose gradually.

Bolten, who considers essential epilepsy a disease of deficient action of the para-thyroids, uses freshly prepared extracts of these glands injected into the rectum. He says his results are remarkable.

A. Kutsinski uses luminal in doses of .15 to .30 gm. daily, never higher. He saw a skin eruption result in one case, and at times gastric distress and nausea. In one case there was staggering. He found no bad effect on heart or kidneys. The worst by-effect is drowsiness which may be quite marked. Luminal reduces the number of attacks, but the attacks return when the drug is stopped.

W. Grzywo-Dybrowski found that luminal had a marked effect even in inveterate cases.

R. Topp says that one bromide is as good as another, except that the organic compounds are not so effective. He praises Dr. Weil's nerve powder, which has the following formula:

haemoglobin	5.
acid albumin	5.
iron	4.
pot. brom.	26.
sod. brom.	54.
Enzian bitters	6.

This is given in unsalted soup.

H. Grabi reports a patient who for the greater part of 2 years and 18 months continuously, has taken .30 g. luminal daily. Although the patient has nephritis, his general health is good. The attacks have been extraordinarily improved, as has also the mental condition.

A. Ulrich says it is good practice to lessen the number of attacks. For example, "A" without treatment has three to six attacks a month; under treatment he has five a year and can work and is no longer a care. He details the Toulouse-Richet diet, which is as follows:

1000 g.	milk
300 g.	beef
200 g.	flour
2	eggs
50 g.	sugar
40 g.	butter
10 g.	coffee

No alcohol, unsalted soup, unsalted meat, unsalted potatoes with butter. There is 2 g. of Na Cl in this diet. This diet was not easy to prepare and patients rebelled on account of its insipid taste.

Ulrich is a strong advocate of Sedobrol, for the introduction of which he is responsible. This is a preparation in tablet form of bromides, and meat and vegetable extracts, which make a palatable soup with hot water. Each tablet contains a little over 1 g. of bromide. He insists that the treatment by bromides be kept up without intermission year in and year out. The bromide treatment is successful only when gradually and steadily induced. In cases which need from 5 to 6 tablets daily ½ to 1 g. chloral by rectum is helpful. When bromism, which is indicated by dullness, apathy, or irritability results, reduce the bromide to 1 or 2 gm. daily and add 1 to 5 g. of Na Cl to food. Barely is it necessary to stop the bromide entirely for more than a day or two. Arsenic is good for the acne. He has Kocher operate where a local cerebral irritation is demonstrable, but does not stop the bromide.

A. Rodiet reports good results in the treatment of 4 cases with the diet of Maurice de Fleury, although no bromides were given. De Fleury says he himself has not been able to omit the bromide. De Fleury injects an isotonic serum every two days. The diet is as follows:

Breakfast—soup, honey, preserves, fruits (raw or cooked), bread and butter.

Lunch—cream soup, cereals, noodles, macaroni, rice, vegetables, potatoes, salads, cream cheese, fruits.

Dinner—same as lunch.

One liter of lactose water (30 g. lactose) a day.

Bouillon cultures of lactic acid bacilli.

T. A. Williams speaks of the good results following a low protein diet (not over 50 g. protein a day). A model diet as follows:

1st—Not over 60 g. dry protein—i. e., not over 300 g. of eggs, milk, cheese, meat, fowl, fish, nuts, peas, beans.

2d—Eat freely of starch and sugar.

3d—Eat freely of fiber and cellulose.

4th—Exercise and bathe freely.

Five oz. of hot water and 5 to 10 gr. Sod. bicarb. while dressing. One-half hour later breakfast of fruit and milk or cream and cereal and milk and bread and butter. Wait 5 hours and take at most 4 oz. of meat or fish, green vegetables, potatoes, and little sweets. Five hours later same as breakfast with the addition of vegetables and macaroni in place of cereal. Drink only water.

It will be seen from the foregoing that the best

of modern opinion is fairly well united on the method of treatment of idiopathic epilepsy. First, sodium chloride should be reduced to the amount of about 2 g. a day. The chlorine ions are then to be replaced by bromine ions so that at the height of the treatment about ⅓ of the body chlorine is replaced. The storage place is the blood serum: The amount of bromide required will be from 3 to 6 g. daily. Binzwanger says that 4 g. is the optimum. This bromide treatment should be kept up indefinitely and with few or no remissions. The diet should be strictly ordered and adherence to it should be insisted upon. The occasional success of the advertising quacks is due to the fact that their nostrums contain an average dose of bromide which they insist upon the patient taking continuously—one frequently sees patients who have taken the medicine of Dr. X, which they get by mail or express, for months and years without interruption. The steady, moderate medication achieves results.

Other drugs such as luminal, chloral, paraldehyde, atropin, sodium borate, etc., may be used as adjuvants or occasional substitutes.

Syphilitics should have arsenic, mercury, and iodides.

Surgery is of benefit in selected cases, but no case surgically treated should be regarded as cured until several years have elapsed, and it is well not to stop the use of bromides. Remember that surgery may aggravate instead of curing, by leaving worse scars and adhesions than the original.

Serum treatment has not yet proved its efficacy, and the claims of Bra and the later elaboration of them by Reed require confirmation.

ROENTGEN TREATMENT OF LOCALIZED PYOGENIC INFECTIONS WITH REPORT OF EIGHT CASES.*

By HOWARD E. RUGGLES, M. D., San Francisco.

In view of the remarkable results of Roentgen therapy in cases of tuberculous cervical adenitis, the question has arisen as to what effect would be produced by similar treatment of localized pyogenic infections.

A brief survey of the literature impresses one with the fact that most writers agree with Pancoast (1) who discusses the subject thusly: "In the case of pyogenic organisms the stimulative or even inflammatory reaction which is unfavorable to the life of the tubercle bacillus may in reality prove favorable to the vitality and stimulate the activity of the former." It has been the belief of many that in the case of tuberculous lesions, the bacillus is destroyed or rendered inactive indirectly, through the reaction induced in the tissues by radiation. The experiments upon which this statement is based were performed before the advent of the Coolidge tube. Since this improved tube has changed Roentgen therapy to a considerable extent, the pathologic and Roentgen laboratories of St. Luke's Hospital, with the kind cooperation of Dr. H. E. Foster of the Cutter laboratories, are endeavoring to determine the effect of direct radiation upon cultural growths of various organisms.

Three months ago, Dunham (2) of Cincinnati reported the results of the treatment of sixty-seven cases of carbuncles by means of the Coolidge tube. The only earlier work upon this subject is that of Coyle (3) whose results with the older methods compare favorably with those obtained by Dunham. The latter's comments are worthy of note. He concludes that "apparently it is the streptococcic infections that receive the most benefit." Furthermore, he states that "nothing in all Roentgen therapy gives such positive and uniformly perfect results as the treatment of carbuncles." Stimulated by such an optimistic report, we, at St. Luke's, have instituted similar treatment in eight cases of localized pyogenic infection. The report of each of these cases follows:

Case 1—Carbuncle: 5 cm. in diameter, 5 days duration, pain, redness, swelling, discharge. One treatment of therapeutic dose. Result: No change for 48 hours, then pain ceased, followed by profuse discharge; in two weeks small crust remaining.

Case 2—Carbuncle: 4 cm. in diameter, 3 days duration, swelling, pain, no discharge. One treatment; pain ceased in 24 hours, followed by moderate discharge, with complete cure in ten days.

Case 3—Chronic Induration: 6 cm. in diameter, following carbuncle, duration one month, slight pain and discomfort, no discharge. One treatment of therapeutic dose, marked improvement, not complete. Repeated with one-half therapeutic dose; complete cure in two weeks.

Cases 4 and 5—Furuncles: 3 cm. in diameter, 4 days duration, pain, no discharge. One treatment: Relieved of pain in 24 hours, no discharge following; complete cure in one week.

Cases 6 and 7—Folliculitis: Duration indefinite; postules appearing in crops of 4 to 8 every two or three weeks. One treatment, full therapeutic dose. After removing existing infected hair follicles, has had no return of trouble.

Case 8—Paronychia: Duration three days, following infection, pain, swelling, redness, no discharge. One treatment: Relieved of pain in 18 hours, followed by slight discharge. Result: Cured in four days.

* Read before the San Francisco County Medical Society September 19, 1916.

* From the Roentgen laboratory of St. Luke's Hospital.

1. Pancoast: Practical Treatment, Musser and Kelley.
2. Dunham, K.: American Journal of Roentgenology, Vol. 3, No. 5, page 259, 1916.
3. Coyle, H. E.: Medical Electrology and Radiology, Vol. 7, page 139, 1906.